

EDCompass newsletter

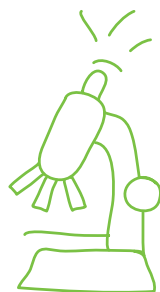
News and resources for educators using SMART products

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A NOTE FROM THE EDITOR

Welcome

Teachers are always trying to find new ways to engage their students in science education. As students get older, educators often see a steady decline in student engagement and achievement in science, and this trend is taking its toll in the form of underemployment in science-related sectors. So this issue of the newsletter, which focuses on science education, is loaded with digital content that you can use with your SMART products in science class, studies that show the positive effects of classroom technology on student outcomes and information about grants to help you purchase SMART products for your science classroom. We also spotlight the **SMART Response™ XE interactive response system**, which features a full QWERTY keyboard, enabling students to enter complete math and science equations.



As always, if you have comments about *EDCompass™* newsletter or any of the information featured in this issue, we'd love to hear from you. Please e-mail us your feedback at newsletters@smarttech.com.

THIS MONTH'S POLL

What percentage of the time do you use educational technology for your science instruction?

[Vote now](#)

NOTES FROM THE FIELD

Students Can Be Scientists Too



By Dave Effron

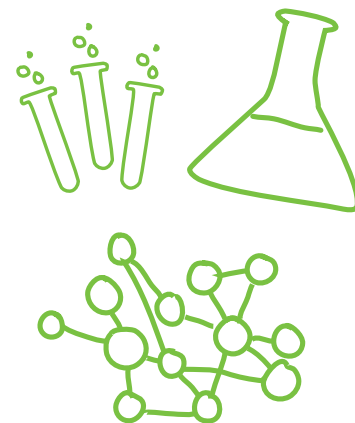
Dominion Middle School
Columbus, Ohio

Teaching science can be difficult, and teaching students to think like scientists can be even more challenging. Thankfully, the middle graders I teach are excited to learn, and they're motivated to come to class. But it wasn't always like this. Yes, they've always been ready for book work and copying definitions. They could regurgitate facts on exams and complete worksheets. But at some point they stopped being curious or using their imaginations. As their teacher, I would spell out things as clearly as possible and spend hours preparing and modifying lessons to be so

straightforward that it would almost become mindless busywork. At times, I would wonder how often students were off task, or if they were socializing instead of doing the work I had so diligently prepared.

Class today starts with a science animation displayed on a **SMART Board™ interactive whiteboard**. A four-minute timer from the Lesson Activity Toolkit is used for the countdown, as students write out their testable hypotheses. A few students will capture their written hypotheses using the **SMART Document Camera™** and then, as a class, we set up an experiment to test those hypotheses. Students can see the scientific process develop, and I acquire good work to print out, e-mail home or use with the next class. Best of all, students are asking questions again, they're thinking outside the box and they're motivated to find answers – both in textbooks and online.

Scientists are learning every day, and they draw from every resource available. They work with other scientists and they ask questions. They find answers and test hypotheses and results by replicating the experiments of others. And when there is no resource available to answer their question, they derive their own experiment. This is the basis for scientific inquiry, and once students learn to embrace it as scientists do, they are able to regain the curiosity, imagination and problem-solving skills within us all.



SMART Notebook™ Lesson Activities



Find a comprehensive database of **K–12 lesson activities** on the SMART Exchange™ website. The activities, many of which are standards correlated, are created by classroom teachers or SMART's team of curriculum resource developers.

Try one of the following SMART Notebook lessons in your next science class.

Scientific Tools

Students in grades 3–5 can learn about the different tools used in science for investigations and inquiry.

Scientific Method vs. Scientific Inquiry

Seventh-grade students can learn the difference between scientific method and scientific inquiry.

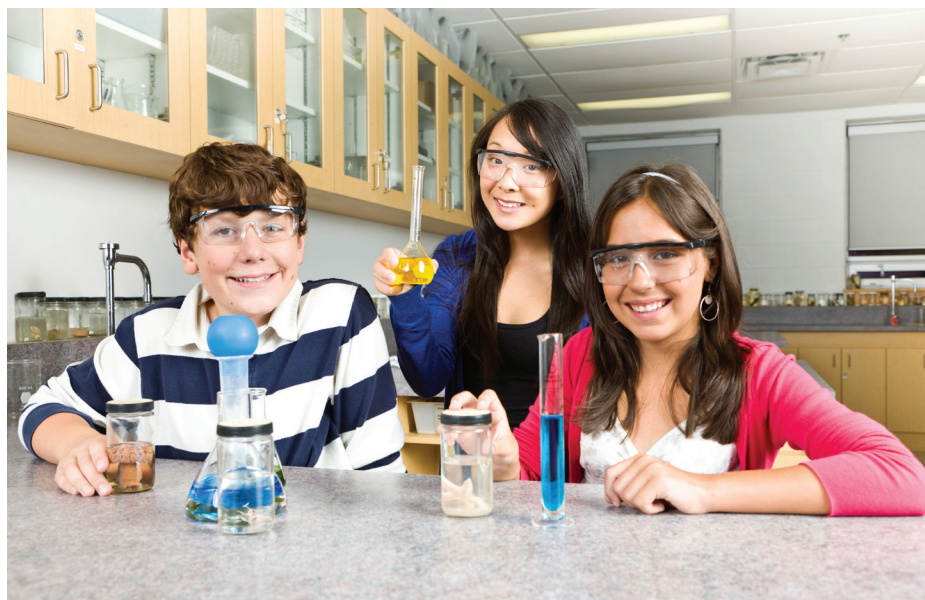
Periodic Table

Eighth-grade chemistry students can identify atomic numbers, symbols and weight on the periodic table of elements.

Understanding Chemical Kinetics

Students in grades 10–12 can calculate reaction rates and learn the factors that influence them. They will also gain a basic understanding of rate laws and reaction order.

[Rate this column](#) ★



Because we are highlighting science in this issue of the newsletter, we've selected a few research studies that report the benefits of SMART products in science classrooms, grant programs that can assist you in purchasing the right technology products for your school and some other great resources available to you. We hope they provide you with ideas and inspiration for your science classroom.

Reports

SMART Board Interactive Whiteboard Utilization in Al-Shifaa Bint Ouf School

In a study released by the [Jordan Education Initiative](#) in March 2010, students from the Al-Shifaa Bint Ouf Secondary School for Girls, located in an underprivileged and overpopulated neighborhood in Amman, Jordan, report that they feel more engaged and motivated when learning math and science with the school's two **SMART Board interactive whiteboards**.

Elementary Science Lab Outreach Efforts: Extending Science Lessons to Support Improvements in Students' Study Skills and Math Performance in Grades 4, 5 and 6

This project by Kathie Heirigs and Halima Thurmon at St. Joseph Catholic School in Memphis, Tennessee, sought to determine the most effective study methods for improving critical math skills for inner-city students. To determine final outcomes, standardized test scores from fall 2007 and spring 2008 were compared using the Iowa Test of Basic Skills (ITBS). Various specific and related skills sections of the ITBS data were examined and significant improvements were noted. In many cases, individual students who were performing below both grade level and the national average showed such significant gains that the project was considered successful in helping to close the gap for targeted skills with these inner-city students.

Report on the Use of the SMART Board Interactive Whiteboard in Physical Science

This project by Dr. Deborah Damcot, Janet Landato and Collette Marsh at William Rainey Harper College in Chicago, Illinois, in 2000, measured the effectiveness of using a SMART Board interactive whiteboard in physical science topics that require visualization of complex phenomena. Among their findings, students self-reported that lectures featuring the SMART Board interactive whiteboard were more interesting and that the use of color helped them better understand science concepts.

SCIENCE GRANTS

Grants

Following are a few grant programs that can assist you in obtaining technology products for your science classroom.

[Visit our website](#) to find other available grant opportunities.

Toshiba America Foundation grants

These grants are for programs and activities that improve teaching and learning in K–12 science and math in the United States.

The foundation focuses its funding on inquiry-based projects designed by teachers for use in their own classrooms. Interested applicants can download application forms from the Toshiba America Foundation [website](#).

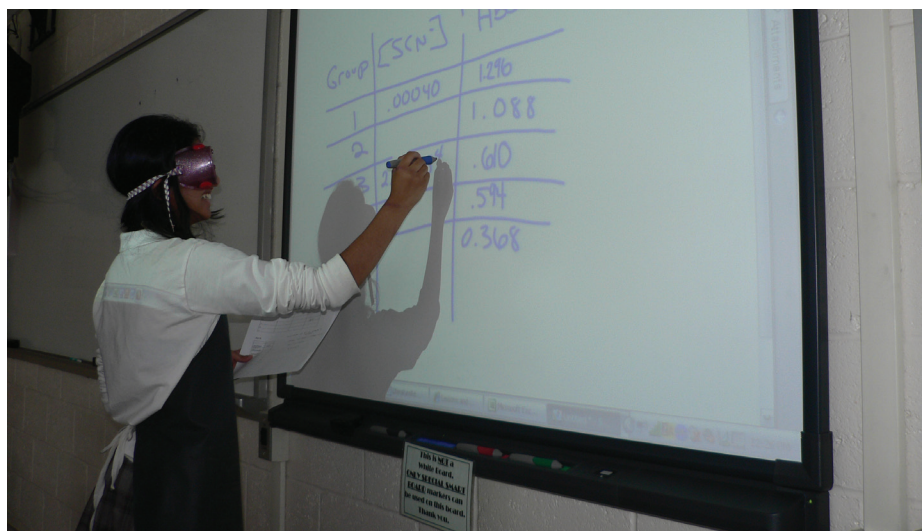
RGK Foundation grants

The RGK Foundation's primary interests within education include programs that focus on K–12, particularly in math, science and reading or literacy. Other interests include after-school tutoring and enrichment, technology integration and curricula, teacher development and higher education. The foundation is particularly interested in programs that attract female and minority students into the fields of math, science and technology. For more information about how to apply, visit the RGK Foundation's [website](#).



FEATURE ARTICLE

Energizing Science Lessons

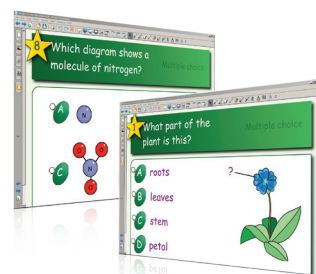


Ian Fogarty's science classes sometimes begin with a story – a real-life example that motivates his students to find the answer or conduct an experiment themselves. Other times, Fogarty asks a question, like the day he surprised his Science 12 class with a big question that led to a class project. [Read the full article](#).

[Rate this article](#) ★

CLASSROOM CONTENT

SMART Response Question Sets



Find a database of [SMART Response question sets](#) on the SMART Exchange website. The majority of the questions are correlated to state and provincial curriculum standards.

Try one of the following SMART Response question sets in your next science class.

Human Life Cycle

K–2 students can test their knowledge of the human growth stages and order them in sequence.

Roots and Leaves

Students in grades 1–3 can test their ability to label a plant diagram and then explore the functions of the roots and leaves.

What Are Molecules?

Students in grades 4–6 can test their ability to identify molecules and atoms.

Plate Tectonics

Sixth- and seventh-grade students can test their knowledge of plate tectonic environments, plate movements and the land masses made from them.

Fundamentals of Genetics Review

Students in grades 7–12 can participate in this *Jeopardy!*-style review of DNA.

The Structure of the Eye

Students in grades 10–12 can test their ability to understand the structure of the human eye.

[Rate this column](#) ★

SMART Table™ Activities



If you're using the SMART Table interactive learning center in your primary classroom, check out the growing number of [SMART Table activity packs](#) on the SMART Exchange website. Most activities correspond to SMART Notebook lessons and SMART Response question sets. You can use SMART Table activities with small groups to complement whole-class and individual learning experiences.

Following are a few science activities to get you started:

My 5 Senses

In this activity by Pronk, kindergarten and first-grade students can learn about the five senses.

Frog Life Cycle

K–3 students can learn about the life stages of a frog – from egg to adult.

Water Cycle

In this Waterford Institute® activity, K–3 students can learn about the water cycle, the types of clouds and precipitation, the different states of water and the quality of water in oceans, rivers and glaciers.

Adaptation

Third-grade students can explore how animals adapt to their environments.

From the CEO

SMART's CEO and co-founder, Nancy Knowlton, has written several articles, which you can find on our website, that provide insight on collaborative classroom technology in education and how interactive whiteboards can support pedagogical and student outcomes in your classroom. Following is an excerpt from her article on the importance of technology products in math and science classrooms, where there's been a steady decline in students' math and science skills.

Math and Science Really Do Matter

For a number of years, some of the biggest names in the technology world – Gates (Microsoft®), Chambers (Cisco®) and Barrett (Intel®) – have been decrying the decline in math and science skills among today's young learners. Certainly there are some star performers, students who will undoubtedly make great contributions in the future, but relative achievement levels are generally declining along with interest in careers in these disciplines.

While this generation is the most switched-on ever, student performance on standardized math and science tests has been declining at an alarming rate, and fewer students in western countries choose careers in math or science. It isn't just technology CEOs sounding the alarm – teachers and administrators alike have noticed the decline.

[Read the full article.](#)

SMART SHOWCASE SCHOOL PROFILE

Soaring Toward STEM Success with the Engineering and Aerospace Sciences Academy



From their science lab at the McMinnville High School Engineering and Aerospace Sciences Academy (EASA), students look out to a real North American X-15 rocket-powered spacecraft. Not a poster of an X-15, not a replica – a real, 14,600 lb. (6,620 kg) aircraft.

[Read the full article.](#)

[Rate this article](#) ★

Energize Lessons with the SMART Response XE Interactive Response System

In chemistry, the term *activation energy* is simply defined as the minimum energy required to start a chemical reaction. And when it comes to teaching any type of STEM-related subject, it may sometimes feel as though it takes a lot of energy to get a reaction from your students.

That's where the **SMART Response XE** interactive response system comes in. As one of SMART's five **interactive response systems**, SMART Response XE enables you to assess learning quickly. Students can instantly respond to science or math questions – whether they're about chemical reactions, gravitational force or the periodic table – and demonstrate their understanding of a concept.

And the SMART Response XE system is the only interactive response system that includes remotes (or clickers) with a full QWERTY keyboard, enabling students to include math equations and scientific functions in their answers.

Accelerate learning

Whether its chemistry, physics or calculus, students are often writing, balancing and solving equations. With the SMART Response XE system, you have the freedom to ask true-or-false, multiple choice and text-based questions to get an indication of student understanding or to go deeper into your assessments by having students answer questions using math expressions and scientific functions.

The system also includes a flexible feature called intelligent grading, allowing you to choose a range of answers that you'll accept as correct. With intelligent grading, you can decide if you'll recognize an answer only in its exact order, in any order or in its mathematical equivalent.

For example, when allowing for equivalent representations of the same answer, both of these acceleration formulas would be graded as correct by the SMART Response XE system:

$$\Delta x = \frac{1}{2}at^2 \qquad \Delta x = 0.5at(t)$$

Get the right reaction

With SMART Response XE, you can quickly create math- or science-based questions using **SMART Notebook collaborative learning software**, and students can use their remotes to type in answers that contain equations, formulas or symbols.

When students finish answering, the remotes will instantly provide them with confidential feedback. The answers are also anonymously summarized as a pie chart or bar graph in SMART Notebook software, making it easy for you and your students to discuss, compare and learn from the answers.



Fast Facts



- **Complete assessment system** – Experience the convenience of the wireless, keyboard-style remotes, a receiver and powerful assessment software
- **Instant insight** – Conduct formative and summative assessment to instantly gain insight into your students' understanding of a concept or lesson
- **Designed for middle and secondary lessons** – Use the SMART Response XE system for teaching middle and secondary lesson content, including advanced math and science content. The remotes allow students to input math equations and scientific functions.
- **Flexible assessment** – Ask different types of questions, including true or false, yes or no, multiple choice, text-based, math expressions and scientific functions. And the intelligent grading feature enables you to choose a range of acceptable answers for a question, allowing for multiple representations of the correct answer.
- **Easy to manage** – Use the Teacher Tools feature to create class lists and view and manage all your student assessment data in one location. The built-in gradebook enables you to record test scores, track performance and create reports.
- **Integrated with SMART Notebook software** – Create dynamic questions and assessments by accessing SMART Response directly in SMART Notebook software. With one touch, you can deliver assessments on the SMART Board interactive whiteboard. You can also show assessment results on a SMART Notebook page and add comments in digital ink.

Investing in STEM



To stay globally competitive, it's more important than ever to focus on students' success in science, technology, engineering and math (STEM). We want our children to love and pursue a career in STEM.

At SMART, we contribute to this goal by creating products like the SMART Response XE interactive response system and [SMART Notebook Math Tools](#) software, which encourage students' participation in and understanding of math and sciences.

There are programs with funding that can be used toward the purchase of technology products such as the SMART Response XE system, including the [Race to the Top fund](#), [Title I Grants](#) and the [Enhancing Education through Technology program](#).

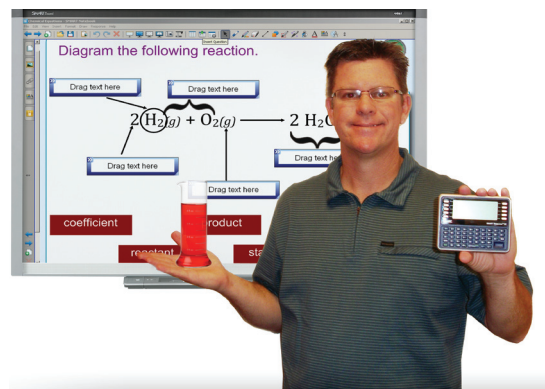
Beyond technology products, SMART is supporting programs like [Change the Equation](#) – an initiative designed to invigorate STEM education in America. There are over 100 companies involved in Change the Equation, including Time Warner Cable® and Xerox Corporation.

Up Next

Watch for the next issue of *EDCompass* newsletter. We're putting the focus on early education.

Ask Sean

Sean McKeever, a former high school chemistry and physics teacher, is the product manager for the SMART Response XE interactive response system. We talked to Sean to find out more about the pedagogical value of the SMART Response XE in middle and secondary math and science classes.



EDCompass What makes the SMART Response XE different from other interactive response systems?

Sean SMART Response XE is the only interactive response system available that features a full QWERTY keyboard, which enables students to input text-based answers and equations and true-or-false and multiple choice answers. And because many students use instant messaging features on their personal cell phones, they already have the skills to effectively use SMART Response XE in the classroom. If SMART Response XE isn't the right fit for teachers or students, we also have SMART Response LE, SMART Response PE, SMART Response CE and SMART Response VE. SMART Response LE is ideal for special needs students or those with pre-emergent reading skills. SMART Response PE features many of the question types that SMART Response XE supports, but the texting keyboard is similar to that of a mobile phone. Finally, SMART Response CE and SMART Response VE are software-based products that turn any computer, smart phone or tablet into a SMART Response remote.

EDCompass With the system's QWERTY keyboard, students can type in full mathematical equations or science functions – how does this help teachers assess students' higher-order thinking skills?

Sean A major part of the science curriculum is helping students understand the language of scientists, which is equations. When students are able to enter full equations as answers, teachers can gain a better sense of the students' thinking processes behind their answers. This insight enables teachers either to review or to move on to more complex concepts right away, rather than to determine student understanding at the end of a lesson or entire unit.

EDCompass As a former physics and chemistry teacher, how would you see this system used in a middle or secondary science classroom?

Sean Curriculum standards for chemistry and physics require that students understand concepts like Newton's laws and stoichiometry, and both concepts can be effectively assessed using SMART Response XE.

EDCompass There is a lot of focus on STEM-related subjects right now. How can the addition of SMART Response XE help students be successful in these areas?

Sean As the only interactive response system that allows students to respond with full math and science equations, SMART Response XE fully supports the teaching and learning of STEM-related subjects. This system provides the opportunity for teachers to ask students process-based questions, including identifying the steps required to solve a problem. By infusing SMART Response technology into the teaching of STEM subjects, students can become more engaged and successful.

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